increased to 100 grams. All of the infusions were clinically uneventful and without discernible side effects.

The morning following the first IV, the patient noted that her upper body strength had improved dramatically, although her legs were still very weak. She also noticed that her headaches were gone for the first time in three months. The morning after the second IV she had the energy to walk just a little inside the house. The morning after the third IV she walked outside for the first time in three months and enjoyed a little sunshine. Her appetite was improving and she was eating more as well.

The first three IV's were given at the patient's home. The fourth, fifth, and sixth ones were given at the clinic. Other than having easy fatiguability, the patient appeared completely normal when she walked into the clinic for her fourth IV. She did note, however, that the night after her fourth IV she did have a brief return of subjective fever before enjoying a good night's sleep. On days five and six she felt normal, but the IV's were still given to try to assure that there was no clinical relapse, as Klenner had noted in the past when discontinuing the high doses of vitamin C too soon in the treatment of a significant viral infection. The patient was also instructed to start taking vitamins C, E, A, and bioavailable B vitamins on a regular basis orally.

Influenza (the "flu") kills as many as 50,000 to 70,000 people annually in the United States alone. The even worse news is that annual influenza deaths have been on the rise, increasing substantially over the last two decades (Thompson et al., 2003). However, vitamin C in high enough doses has already been shown to be very effective at eradicating the influenza virus, sometimes after serious complications such as encephalitis have arisen (Klenner, 1949; Magne, 1963).

In this patient, it should also be realized that 100 grams of vitamin C in an 80 pound body is the equivalent of 250 grams in a 200 pound body. Furthermore, the dose of glutathione is substantially higher than given in most centers. Glutathione can be considered as one of the most important intracellular antioxidants, while vitamin C operates prominently in both the intracellular and extracellular areas.

While the IV's offered at our center are not prohibitively expensive for most, many patients might not want to "take a chance" on spending $1,000 to $1,500 over a five to seven day period for fear of not getting better. Cost of medical therapy is always a factor, and the doses of vitamin C and glutathione used here require a charge of $150 to $250 per IV, depending upon the size of the patient. However, when a patient can go back to work after the first 24 to 48 hours of treatment, these economics can often make a lot of sense.

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Vitamin C and Severe Influenza: A Case Study

While the scientific literature has abundant documentation of the ability of vitamin C to cure a number of viruses considered to be incurable (Stone, 1972; Smith, 1988, Levy, 2002), I feel it is always of benefit to health care practitioners who are still a bit reluctant to freely give large doses of vitamin C to hear of yet another dramatic case report. In this particular case report, the viral infection had reached the point of being life-threatening, even though it was afflicting a young woman who previously had always been in notoriously good health.

P.M., a 26-year-old massage therapist from Scotland, was in her baseline state of robust health when she gradually began to notice a persistent fatigue that lasted for an entire month. Other than this fatigue, however, she had yet noticed no other problems. After a month of this fatigue, she then fell ill quite rapidly with classical flu-like symptoms, including fever, chills, muscle aches and pains, headaches, and nausea. This syndrome occurred in Denver, Colorado, the epicenter of a flu epidemic that had already infected over 6,000 people statewide and killed over ten children and infants. She fought these symptoms as bravely as she could for seven to ten days by trying to continue her usual activities of going to school. However, by the time this period had passed, she only had the energy to stay in bed.

She remained in bed for the next ten weeks, unable to regain enough energy to take any more than the handful of steps needed to get to the bathroom and back to bed. She noted that when she even attempted any greater level of activity, she would subjectively get a return of fever along with a worsening of her near-constant headaches. She described her headaches as being so severe that it literally took too much effort to even keep her eyes open for more than a few minutes at a time. Fortunately, her nausea was not accompanied by vomiting, or she likely would not have lasted the three months. As it was, she went from approximately 100 pounds down to 80-85 pounds when she was first evaluated and treated.

Her initial physical examination was only really remarkable for her obvious emaciation and loss of fat and muscle mass. There was no evidence of enlarged lymph nodes or enlarged liver, as is often seen in infectious mononucleosis. She did have blood testing suggestive of a past Epstein-Barr virus infection, but this was not suspected to be playing any significant role in the development of her present illness. It is possible this virus may have caused the fatigue and likely immune compromise that left her even more susceptible to becoming another flu victim. Routine blood work that included a complete blood count and biochemistry profile was within normal limits, including the basic liver function tests.

While I could not remember the last time I made a house call, I was convinced by the patients caregiver that hauling her out of bed and down to my clinic would probably do more harm than good. My office manager and I brought the clinic to her - the IV, that is. The first IV consisted of 1,000 cc of lactated Ringer's solution with 50 grams of sodium ascorbate. Small doses of calcium gluconate, magnesium sulfate, and a complex of B vitamins (without B12) were added to the bag. This was infused over about three hours. Just before the bag was empty, six grams of glutathione was added to complete the infusion. This same regimen was repeated for a total of six infusions over six days. The last five infusions had no calcium added, and the sodium ascorbate amount was...
takes care of such situations fairly promptly. Furthermore, such a side effect can actually give the health care practitioner a practical point beyond which further intravenous nutrition should not be pushed acutely.

Anecdotally, I have had the occasion to clinically cure a case of acute Lyme disease with three days of intravenous vitamin C therapy. Whether this is readily repeatable, or whether a chronic case of Lyme disease would respond as well remains to be seen. At the Colorado Integrative Medical Center we are now initiating a combination of therapies including those mentioned in this newsletter to see precisely how much success we can have on a regular basis with this particular disease. We are presently accepting new patients at this time who have this condition and are looking for another treatment option.

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minutes can be expected to temporarily increase the peak blood concentration by 10-fold or more over the rapid intravenous infusion. This amount has already been administered safely on multiple occasions.

A physiological effect of such a rapid administration of vitamin C appears to occasionally induce an acute hypoglycemia. Sylvest (1942) found that a majority of people given intravenous vitamin C showed a clear lowering of blood sugar. This effect is possibly due to a significant reflex release of insulin from the pancreas. Such a conclusion is directly supported by the work of Cheng et al. (1989), who found that vitamin C injected into rats "produced a dose-dependent and marked hypoglycemic effect after intravenous injection." They also found that the hypoglycemic effect was maximal at five minutes after injection, coinciding with an increase in the plasma insulin concentration. Vitamin C is a very similar molecule to glucose, and a rapid spike of vitamin C released into the blood likely can induce the same reflex insulin spike that is seen in a glucose tolerance test, where a large dose of glucose is given to evaluate how quickly and effectively one can restore glucose levels to normal by inducing insulin release. Clinically, this hypoglycemic effect has been the most notable in patients who are ingesting little food and drink, and in those patients who are generally sickest, as in advanced neurological conditions. In such patients just an infusion of vitamin C can cause hypoglycemia as well, not requiring the rapid IV push. Such patients may need a bolus of 50% glucose to rapidly reverse the low blood sugar, as it has been noted to occur even when the carrier IV fluid is 5% dextrose (sugar) in water. However, the IV push does seem to more reliably cause the hypoglycemic symptoms, which fits with the animal literature cited above.

This vitamin C-induced hypoglycemia should prove to be a very desirable effect clinically, however. Severe hypoglycemia has already been safely and deliberately induced in a protocol that has been in existence for over 70 years now. Known as insulin potentiation therapy (www.iptq.org), intravenous insulin (roughly 20 to 40 units) is given rapidly to induce hypoglycemia. As hypoglycemia becomes manifest, minidoses of cancer chemotherapeutic agents are administered. Such small doses, in the presence of insulin-induced hypoglycemia, appear to be facilitated in their transport across the cell membrane pathways such that the drugs reach killing concentrations inside cancer cells at much lower dosage levels. Traditional chemotherapy can often be given without causing the otherwise inevitable loss of hair seen with the much larger doses.

Vitamin C and glucose actually directly compete with each other for insulin-mediated transport into the various cells of the body (Washko et al. 1991; Cunningham, 1998). Increased intracellular access should prove to be a major leap forward in the effective treatment of most diseases already known to be responsive to vitamin C, and in likely quite a few more diseases that just need more effective dosing of vitamin C to show a positive response. Proprietary protocols being developed at the Colorado Integrative Medical Center are using such "Vitamin C-Enabled Intracellular Nutrition" (VEIN) methodologies.

A side effect associated with high doses of vitamin C, along with other nutrients given intravenously, and sometimes associated with concomitant hyperbaric oxygen therapy, has been noted at our facility. On three occasions patients have complained of bilateral mid-back discomfort. When this has been reported, further intravenous nutrients are discontinued, oral hydration and intravenous hydration are initiated, and oral or intravenous furosemide is given. This has resolved the discomfort in all circumstances. No associated abnormal laboratory findings have been seen to result. It is hypothesized that when the solute load gets high enough in the blood perfusing the kidney, a dehydrating effect is acutely inflicted on the kidney cells, causing the pain/discomfort reflex. Neglected, more serious complications could occur. However, the regimen just outlined
Pulsed Intravenous Vitamin C (PIVC) Therapy

Vitamin C has already been extensively and unequivocally documented to readily cure a wide range of infectious diseases/including many viral syndromes considered incurable even today (Stone, 1972; Smith/1988, Levy, 2002). In reviewing a great amount of this information, it becomes apparent that for most infectious diseases, especially viral ones, the only clinical failures of vitamin C appear to occur when a large enough amount of vitamin C cannot be effectively delivered to the invading microorganisms.

With this in mind, then, a more effective dosing and/or delivery system of vitamin C to the various tissues of the body should further improve the clinical efficacy of this agent. In cancer, Riordan et al. (1995) demonstrated the likelihood that vitamin C was an effective anti-tumor therapy as long as high enough concentrations of it could be achieved inside the tumor(s). These researchers also concluded that oral vitamin C supplementation was unlikely to produce blood levels of vitamin C high enough to have a direct killing effect on a given tumor. Later, in studying a certain line of cancer cells and the ability of vitamin C to kill those cancer cells, Casciari et al. (2001) elegantly demonstrated this point. They showed that the rapid intravenous infusion of vitamin C as sodium ascorbate in combination with alpha lipoic acid was effective in reaching vitamin C levels that were toxic to the cancer cells. They also showed that a fat soluble analogue of vitamin C, phenyl-ascorbate, was able to kill cancer cells effectively at a dose roughly three times lower than seen with unaltered vitamin C.

All of the conclusions reached by Casciari et al. noted above support the proposed concept that most clinical failures of vitamin C for infections or other medical conditions relate to inadequate delivery. They administered as much as 60,000 mg of vitamin C over an 80-minute period, a very sizable dose and a fairly rapid administration by most standards of current usage. Yet such a large and rapidly administered infusion of vitamin C will not always be clinically effective. This still does not mean that the vitamin C might not be the optimal treatment for a given condition.

At the Colorado Integrative Medical Center (www.coloradomedicalcenter.com) in Denver, CO, we are starting to use a unique form of vitamin C therapy known as pulsed intravenous vitamin C (PIVC) therapy. First and foremost, this therapy utilizes the principle that the more rapidly a given dose of any nutrient or medication is given, the higher the peak blood level of that substance will be. This very rapid delivery of vitamin C was first reported to be both safe and highly effective by Klenner (1971). In acute barbiturate overdose Klenner gave as much as 42,000 mg of vitamin C "by vein as fast as a 20 gauge needle could carry the flow." This dose awoke the patient and began the reversal of the barbiturate toxicity without causing any side effects of note. Klenner safely administered IV push vitamin C on multiple occasions, often on very critically ill patients, with great clinical success and no reported toxicity.

The concept of PIVC is to get acute blood levels of vitamin C as high as possible. By simple diffusion physiology, an acute doubling or tripling of the blood vitamin C levels will temporarily allow an acute doubling or tripling of the amount of vitamin C that normally diffuses into perfused tissues via the gradient that is present at the baseline concentration. The temporary blood levels achieved can be substantial. If Casciari et al. can get a certain high blood level from infusing 60,000 mg of vitamin C over 80 minutes, then an IV push of 20,000 mg of vitamin C over 2
well, as long as the dose administered supplies enough electrons on a daily basis to reverse the ongoing oxidative damage from the disease process.

Unipolar magnetic therapies probably affect electron delivery to an injured site as well. Electricity is considered the flow of electrons. Putting a magnetic field in motion will induce electricity. Electron flow would appear to be intimately involved in the physical and biological effects of magnetism. The work of Davis and Rawls (1975, 1979) established nicely that a North pole magnetic exposure decreased inflammation and pain, while suppressing microbial growth. The South pole had the opposite biological effects. One possible explanation for these findings is that a North pole magnetic field facilitates the delivery of electrons into exposed tissue, while the South pole facilitates the transport of electrons away from exposed tissue. Regardless, the proper use of the North pole of a strong biomagnet closely mimics the effects of vitamin C delivered systemically. Kulish (1999) summarizes the effects of such biomagnetic therapies nicely.

Is compromised electron flow the final common denominator in producing the symptoms and effects of most (or all) diseases, infections, and toxin exposures? Regardless of the answer, the vigorous and persistent dosing of antioxidant therapy, as discussed and researched in my new vitamin C book, appears to deliver consistently positive and dramatic clinical outcomes.

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cell wall, it plays a vital role in maintaining the optimal levels of the metabolically active antioxidant, vitamin E, at that site.

It appears, then, that the local loss of electrons (oxidation) represents the primary degeneration, or metabolic breakdown, of the tissue or chemical substance losing the electrons. An antioxidant can serve to immediately restore this loss of electrons, resulting in a prompt "repair" of that acutely oxidized tissue. Also, an antioxidant can often neutralize the oxidizing agent before it gets a chance to oxidize, or damage, the tissue initially.

All of the vitamin C / toxin exposure studies reviewed showed one or more of the following findings or consequences in the test tube, tissue, intact animal, or human studied:

1. Decreased levels of vitamin C and other antioxidants (blood and/or the tissues most specifically affected)
2. Increased levels of oxidative stress in the test setting, indicating ongoing oxidation
3. Increased liver production of vitamin C (in those species capable of this), as an adaptive response
4. Increased rates of consumption of vitamin C and other antioxidants
5. A direct correlation between toxin activity and antioxidant levels (lower antioxidant levels, greater clinical toxicity)
6. The acute induction of scurvy or other clinical findings consistent with the acute depletion of vitamin C.

It is important to reemphasize that the above findings were always part of the toxin exposure situation regardless of the chemical structure of the toxin. One conclusion that can be reached from this information is simple, elegant, and very compelling: All toxins poison by oxidizing enzymes and tissues.

There is also a compelling conclusion generated by this observation and supported by the vitamin C studies found in the scientific literature: All toxic damage can be repaired by a high enough dose of antioxidants.

Of course, such therapy must be given in a timely fashion, before irreversible clinical consequences have occurred in the poisoned subject.

Interestingly, infectious diseases inflict their damage in essentially the same way as toxins. As virulent microbes grow inside a host, one or more of the same six findings as already listed above will reliably be observed. Basically, microbial growth is just another way to directly cause oxidative damage to the tissues most directly involved. Some of the most devastating infectious diseases also produce potent toxins that further increase the oxidative damage and stress to the infected host.

Chronic disease can be viewed as a process in which the oxidative stress proceeds at a much slower pace than is seen with acute infectious diseases and acute toxin exposures. Vigorous antioxidant therapy goes a long way in reversing the clinical manifestations of such diseases as
Electrons, Toxins and Disease

Many scientific phenomena, perhaps a majority of them, ultimately obey or follow fairly simple laws of nature, once discovered and understood. The scientific concepts we understand the least are often cloaked in the most complex of language and theories. When any scientist cannot clearly explain his or her research to a layperson unschooled in that area, there usually exists a corresponding lack of complete understanding by that scientist. One can research the outer layer of an onion indefinitely without having any understanding of what is going on several layers deeper. Yet the onion as a whole can remain a mystery even though mountains of research data might have been generated on the outer layer.

While researching thousands of articles over the last few years in the preparation of my latest book on vitamin C (Levy, 2002), interesting patterns began to emerge. Even though the effects of vitamin C on over 25 different infectious diseases and over 100 different toxins were examined, common mechanisms of action became apparent. This was especially significant to me since I had long wondered how a single chemical entity (ascorbate, or vitamin C) could have such dramatically positive clinical effects on such a wide array of completely unrelated chemical compounds and infectious agents. Quite literally, there seemed to be no exceptions to this vitamin C effect. Even if vitamin C did not cure a given infection or toxic state, it always helped resolve such a condition to some degree.

Dr. Albert Szent-Gyorgyi, the brilliant scientist who won the Nobel Prize in 1937 for his discovery of vitamin C, also advanced what I would call a true theory of life in two of his last publications. Szent-Gyorgyi (1978,1980) asserted that energy exchange in the body can only occur when there is an imbalance of electrons among different molecules, assuring that electron flow must take place. Natural electron donators give up electrons to natural electron acceptors. Szent-Gyorgyi maintained that dead tissue had a full complement of electrons, a state in which no further exchange or flow of electrons could take place.

Another way of viewing this is that brisk electron flow and interchange equals health, impaired or poor electron flow and interchange equals disease, and cessation of flow and interchange equals death. Vitamin C, as the premier antioxidant in the body, is perhaps the most important ongoing electron donor to keep this electron flow at optimal levels.

Oxidation involves the loss of electrons, and an antioxidant counters this process by supplying electrons. Although vitamin C is the most important antioxidant in the body, there are many different anti-oxidants present in the body, and many of them work to keep the more important antioxidant substances in the body in the reduced state, which allows the donation of electrons. For example, vitamin E is an antioxidant that is fat soluble, which is important in allowing it to be the primary antioxidant present in the lipid-rich cell membranes of the body. Vitamin C, which is water soluble, helps to recharge oxidized vitamin E in those cell membranes back to the electron-rich reduced form. Even though vitamin C is not the primary antioxidant in the body...


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that vitamin C reduced the toxicity of the vast majority of these agents. It should also be noted that these were predominantly diverse, rather than similar, agents.

Vitamin C has also been seen to neutralize the toxicity of a number of different bacterial toxins produced in the anaerobic environment of deep dental infections. When tested against specific critical enzymes, many of these toxins were substantially more toxic than botulinum toxin. Nevertheless, patients who were clinically ill from the effects of this group of toxins invariably showed dramatic improvement from the infusion of enough vitamin C.

Regardless of the mechanism, which is probably not singular in nature anyway, vitamin C should be the agent of choice for all acute poisonings. In many cases, the ascorbate ion in vitamin C directly neutralizes the toxin. In other cases, the vitamin C improves immune function enough to help negate the toxic effect through immune mechanisms. Remember that an acute infusion of vitamin C is virtually harmless. Klenner typically started a vitamin C infusion in his office on all of his sick patients even before he made a diagnosis. He never hurt anyone with this practice, and he helped very many. In any case of suspected poisoning, start high-dose intravenous vitamin C with vigorous hydration immediately, and then proceed with a diagnostic workup so that specific antibiotics and/or specific antitoxin therapies can later be added to the treatment. In an acutely poisoned and/or infected patient, there is no good reason not to proceed with the vitamin C infusion immediately, as all poisonings and infections rapidly metabolize what vitamin C is present in the body, making an acutely-induced scurvy-like state part of the clinical presentation. Any scurvy-like state requires vitamin C to be resolved, and such a state will make any existing infection or toxic medical condition worse and more difficult to treat effectively.

Bibliography


The inhalation form of tularemia, which would be the type of tularemia likely seen in a bioterrorist attack, tends to present abruptly, with fever, chills, body aches, runny nose, and sore throat. Cough with chest discomfort and other signs of pneumonia can then appear (Pullen and Stuart, 1945). Left untreated, one third or more of patients with pneumonic tularemia can be expected to die (Stuart and Pullen, 1945). Properly treated, however, less than 2% of patients should die (Evans et al., 1985).

Vaccination for tularemia is presently not advised except for laboratory personnel who are routinely working with *F. tularensis* bacteria (Dennis et al., 2001). A wide variety of antibiotics are available to effectively treat this disease at this time. However, laboratory manipulation has been demonstrated to produce strains of tularemic bacteria that are resistant to some of the commonly used antibiotics (Överholt et al., 1961; Pavlov et al., 1996). This raises the unsettling possibility that tularemic bacteria prepared specifically for bio-warfare may not be as readily killed with antibiotics as the bacteria found in the naturally occurring disease. To be sure, take all recommended antibiotics for any tularemic infection, but don't neglect to add the vitamin C as previously discussed. In reviewing the scientific literature, I could find no cases of infectious disease that were shown to be initially susceptible to vitamin C, only to later develop a resistance to vitamin C. This development of resistant strains of bacteria appears to occur only when manmade antimicrobial drugs are used for a long enough period of time.

**Botulinum Toxin**

Botulinum toxin should probably result in more fear and anxiety over its possible use as a bio-weapon than just about any other agent. This is because it is extremely potent and capable of killing easily. Furthermore, it is a refined toxin; there is no infection to be attacked.

Botulinum toxin is presently considered to be the most poisonous substance known (Gill, 1982). Although it would be very difficult to accomplish technically, "there is enough potency in one gram of botulinum toxin to kill over one million people if properly dispersed (Arnon et al., 2001).

Botulinum toxin is produced by the metabolism of the bacterial species known as *Clostridium botulinum*. Although only a very small dose of this toxin can be fatal when swallowed, a roughly 100-fold smaller dose can be expected to be fatal if inhaled.

The symptoms of botulism are those of a progressive paralysis starting in the muscles of head and neck, proceeding eventually to weakness of the other muscles in the body, including the arms and legs. Death results from respiratory insufficiency from either the relaxation of the throat musculature blocking air entry into the lungs, or from inadequate air movement by the weakened respiratory muscles surrounding and supporting the chest cavity.

The treatment of botulism, aside from supportive care, involves an antitoxin that immunologically neutralizes the botulinum toxin. However, an early clinical diagnosis and prompt treatment are essential to save the exposed patient.

Vitamin C is just as useful for the treatment of a pure toxin as it is for the treatment of an infectious disease. Jahan et al. (1984) and Dey (1966) both showed that vitamin C could effectively neutralize tetanus toxin. Tetanus toxin is also produced by a *Clostridium* species of bacteria, like botulinum toxin. Klenner (1974) reported curing a four year old receiving a "full strike" from a highly poisonous moccasin snake. Klenner (1957) also reported the complete clinical neutralization of the toxin associated with a black widow spider bite. Calabrese (1985) reported on the effects of vitamin C on a group of 24 pesticides, heavy metals, hydrocarbons, and gaseous pollutants, noting
headache, muscle and joint aches, fever, and chills. Often only hours later, swollen, tender lymph nodes will appear in the neck, armpit, and groin areas, indicating a rapid progression of the disease through the body. These swollen lymph nodes are known as buboes, giving rise to the name bubonic. When this form of the plague goes untreated, more than 50% of those infected will die. Septicemic plague is almost uniformly fatal when left untreated. This form of plague involves a large amount of infection in the bloodstream. Bubonic plague can sometimes lead to septicemic or even pneumonic plague. Those patients who progress rapidly to a septicemic form of plague probably have weaker or more compromised immune systems, which facilitate the rapid spread of the disease in the blood.

Pneumonic plague, somewhat like inhalation anthrax, requires early and aggressive treatment to avert a fatal outcome. Furthermore, unlike bubonic or even septicemic plague patients, pneumonic plague is readily contagious (Ratsitorahina et al., 2000).

If used in the future as a bio-weapon, the plague will not be spread by large numbers of infected fleas. Rather, the spread would be most probably achieved by inhalation of an aerosol form of Y. pestis microorganisms, which would result immediately in a large number of people getting the pneumonic form of the plague. Furthermore, this would greatly accelerate the transmission of the disease among susceptible populations of people, in contrast to the amount of transmission that would occur if the plague infection presented in the bubonic form.

Early diagnosis would be critically important for the survival of individuals exposed to an inhalation form of plague. Until the first case was confirmed in the laboratory, patients would be considered to have gotten a very aggressive form of pneumonia. Broad spectrum antibiotic therapy would save some if instituted soon enough. The antibiotics that have been most effective in treating the plague include streptomycin, gentamicin, doxycycline, tetracycline, and chloramphenicol. The antibiotics commonly used for infection prevention after known exposure are tetracycline, doxycycline, and trimethoprim-sulfa methoxazole (Conn's Current Therapy 2001).

A vaccine is no longer available for the plague. Furthermore, the vaccine that had been developed only showed benefit against the bubonic form of plague. It did not appear to prevent or lessen the consequences of the pneumonic form of plague (Speck and Wolochow, 1957).

For the same reasons discussed in the first issue of “Health E-Bytes,” vitamin C would be an excellent adjunct therapy for the plague. Both oral and intravenous administrations of vitamin C would result in a significant bolstering of the immune system. While a high enough dose of vitamin C could logically be completely effective as a monotherapy treatment for the plague, there is certainly no reason not to take both the appropriate antibiotics along with the vitamin C. Furthermore, since no specific reference could be found in the literature on vitamin C and plague, it would be inappropriate to try to treat the plague with only vitamin C, even though its effect on other bacterial diseases would predict a high likelihood of complete clinical success in the treatment of plague.

**TULAREMIA**

Tularemia is a disease caused by a type of bacteria known as *Francisella tularensis*. Although not one of the potential bio-weapons that is familiar to many people, the transmissibility of tularemia could make it especially effective as a bio-weapon. *F. tularensis* is one of the most infectious of disease-causing bacteria, and the inhalation of as few as 10 organisms has been known to cause disease (Saslaw et al., 1961).
Bioterrorism: Beyond Anthrax and Smallpox

This second issue of "Critical Response Health Alternatives" is intended to not only discuss potential modalities of future bioterrorism attacks, but also to reiterate the enormous benefit that optimally dosed intravenous and oral vitamin C would offer such infected or poisoned individuals. I have already had individuals ask me how they could get intravenous vitamin C for themselves and their families in the event of a sudden toxin and/or infectious exposure. The answer at this point in time, unfortunately, is that it would be difficult for many to get treated in this fashion and impossible for everyone to get treated in this fashion. That is why I am making the effort to publish this newsletter. Wonderful information that never gets widely disseminated is of little or no substantive value for the general population.

With these thoughts in mind, then, I urge all readers of this newsletter to forward it not only to friends, but also to as many members of the professional health community as possible. Even though 95 out of 100 doctors might just chuckle when they read these newsletters, perhaps the other 5 will be open minded enough to seriously and scientifically evaluate what is being said. Any doctor who examines the original literature citations on the information that I am presenting can only conclude that vitamin C is as amazing as I say it is, or they can conclude that many different clinicians and primary researchers are simply lying in order to accumulate scientific publications for their resumes. If even one doctor eventually realizes the practical impact of this information and starts treating patients with critical infectious diseases with proper doses of vitamin C, a very significant impact will eventually be made on many patients. One practicing physician impacts the health and lives of many people.

And what does Dr. Levy get from all of this? For my more cynical readers, I may eventually sell a few more of my books, and I may eventually get more readers to visit my website and other linked web sites. However, my primary purpose is to get long overlooked and long-ignored information its proper recognition. I want to see sick patients in need of treatment get the best treatment available. That's all.

A few more potential bio-weapons will now be discussed. There are actually very many more bio-weapons than these that could end up being used, but the following three agents have been considered prime candidates for bioterrorists for some time now. These agents, plague, tularemia, and botulinum toxin, will be separately discussed and analyzed.

PLAGUE (Bubonic Plague, Pneumonic Plague)

Human plague is caused by a type of bacteria known as *Yersinia pestis*. Humans usually contract this disease when bitten by plague-infected fleas. It has been noted in the past that epidemics of this disease in humans were often preceded by the death of large numbers of rats, further forcing fleas to leave their preferred rodent hosts and seek out humans (Inglesby et al., 2000).

Clinically, plague can present in three different forms: bubonic, septicemic, and pneumonic. Most naturally occurring cases are bubonic. This form of infection has an incubation period of 2 to 6 days. The clinical onset of symptoms is characteristically abrupt, with a sudden onset of


deliver as promised when Linus Pauling's recommendations of a few grams of vitamin C a day did not end up curing or completely preventing the common cold. To be sure, it did make those infected feel better, and it shortened the durations of their symptoms. It did also lessen the likelihood of getting a cold. Once entrenched in the body, however, the common cold results in a very high titer of virus particles. A few grams of vitamin C will help the immune system cope, but it is not remotely enough to promptly eradicate the virus load present. However, several hundred grams of vitamin C intravenously daily for 2 to 3 days can be expected to knock out the common cold in most people. The next time you have already been sick with a cold for a few weeks, you will appreciate what a remarkable clinical response this is.

After determining your best daily dose of vitamin C by following the bowel tolerance method outlined by Cathcart (1981) and after taking that daily dose regularly, the likelihood of contracting any infectious disease, anthrax and smallpox included, is remote. For many people, this will translate to a total daily dose of vitamin C of 8 to 15 grams taken in divided doses, although some people will require more. The recommended form of vitamin C would be sodium ascorbate, although ascorbic acid would be perfectly acceptable. I do not recommend high doses of calcium ascorbate.

If you are exposed to a very high dose of infectious organisms, the maintenance doses of vitamin C noted above can be overwhelmed and clinical infection can still result. The simple answer then is to start vitamin C infusions at up to 700 mg/kg at a time as often as is necessary to obtain a positive clinical response. Lesser amounts and less frequent dosing can be used if the clinical picture is not severe. Obviously, the administration would have to be very vigorous in an inhalation anthrax patient who has already developed lung symptoms and death may be only hours to a day or two away. Certainly, in the case of anthrax, there is no reason not to take all prescribed antibiotics as well, but the antibiotics will have little effect if large amounts of anthrax toxin have already been produced. The vitamin C would be essential at that point. In viral diseases where bleeding complications occur, the bleeding will often occur at those sites in the body where vitamin C levels are lowest, or even nonexistent. It is absolutely characteristic for such "focal" sites of scurvy to hemorrhage, and nothing short of very large doses of vitamin C given very quickly can be expected to save the patient at that point.

Regardless of any skepticism that the reader may have toward such high-dose vitamin C therapy, it is absolutely unthinkable not to try it or add it to whatever protocol is being administered to the patient. At the very least, all acute infectious diseases rapidly metabolize vitamin C, and all acutely ill patients are consequently deficient in vitamin C. The administration of vitamin C should always be undertaken when acute vitamin C deficiency is a certainty, even if one does not believe that enough vitamin C can be a definitive therapy by itself.

Hydration is also extremely important, both in health and disease. Furthermore, vigorous hydration (2 to 4 quarts of water daily) will augment the effectiveness of the vitamin C therapy. Just about the only time high doses of vitamin C can cause problems is if the patient is not kept very well hydrated. Remember that patients with high fever lose body water rapidly. Most other medicines have more side effects in the face of dehydration as well.

There are many other supplements and nutrients that can augment the antimicrobial effects and immune-bolstering effects of vitamin C, which is beyond the scope of this issue of the newsletter. Just don't neglect the most important one: vitamin C.

Bibliography

Vitamin C, typically as ascorbic acid or sodium acerbate, should prove to be highly effective against both of these conditions. I say "should" only because their rareness has prevented any single vitamin C researcher from encountering enough cases to conduct a meaningful study and publish it. However, the likelihood that both of these conditions could be completely cured, even in their advanced stages, is compelling. Consider the following information:

The medical literature has clear documentation that high enough doses of injectable vitamin C are almost always effective in curing any of a number of viral infections still considered today to be incurable. Klenner (1949) completely cured 60 out of 60 cases of infantile polio in North Carolina in the middle of a polio epidemic. Several infants already had neurological involvement, but nevertheless recovered completely. Klenner (1951) was also able to bring about a complete recovery by administering enough vitamin C to one five year-old polio victim who had already been paralyzed in both legs for over four days. Klenner (1949, 1953, 1971, and 1974) also reported the repeated ability to rapidly cure viral diseases such as encephalitis (often presenting in the comatose state), herpes infections, acute hepatitis, measles, and mumps. Klenner found that his only inadequate responses to treatment were overcome by increasing the vitamin C dose and/or going from an oral to an injectable form of vitamin C. Cathcart (1981) also reported an incredible success in the treatment of many viral diseases for which no specific antiviral agents exist today. Of particular interest, he reported that he never had a case of viral hepatitis fail to respond to intravenous vitamin C. Furthermore, he never observed a single case of acute hepatitis treated appropriately with vitamin C to persist long enough to evolve to the status of chronic hepatitis. Finally, although no specific studies looking at the effects of vitamin C on smallpox could be found, Kligler and Bernkopf (1937) were able to determine that relatively small doses of vitamin C could easily kill the vaccinia virus, which is the virus in the vaccine that induces immunity to smallpox.

Vitamin C has also been documented to rapidly resolve a number of non-viral infectious diseases that do not readily resolve in the absence of vitamin C therapy. Diphtheria (Klenner, 1949 and 1971), whooping cough (Otani, 1936 and 1939; Ormerod et al., 1937), and tetanus (Klenner, 1954) all have responded very well to vitamin C. Of great interest as well is that all three of these infections are associated with very significant microbe-generated toxins, much like anthrax. Jungeblut and Zwemer (1935) found that vitamin C both inactivated diphtheria toxin in the test tube and protected guinea pigs against the fatal outcome of being injected with otherwise fatal doses of diphtheria toxin. Dey (1967) showed that enough injected vitamin C would completely protect rats from otherwise fatal doses of tetanus toxin.

Klenner never encountered a virus he could not cure, although he used doses of vitamin C that are considered outrageously high today, even though such doses are nevertheless decidedly nontoxic. His initial dosing of vitamin C would go as high as 700 mg/kg body weight, which could exceed 70 grams for a large man. Furthermore, he would repeat this high dosing in only a few hours if no drop in fever or clear clinical improvement resulted. He never reported any toxicity from vitamin C dosed in this fashion. However, he repeatedly reported that initially unresponsive patients did finally respond when enough vitamin C was administered frequently enough. From the very current scientific literature we know that 60 grams of vitamin C can be repeatedly infused without toxicity over only an 80 minute period. Furthermore, 50 gram intravenous doses of vitamin C can be given daily for 8 weeks without any side effects other than improved health (Casciari et al., 2001).

My own clinical experiences with intravenous vitamin C infusions allow me to completely believe all of the data that Klenner and others have accumulated. Many feel vitamin C did not
no effect on bacterial toxins that have already been produced. Antitoxin therapy, a treatment intended to neutralize a toxin, was tried in the past, but this therapy is not currently available. A good recent review of anthrax as a biological weapon was compiled by Inglesby et al. (1999). Interestingly, the 21st edition of the Cecil Textbook of Medicine, copyright 2000, considers penicillin as the drug of choice for anthrax. Cipro (ciprofloxacin), which is currently being highly touted in the news, is listed along with a number of other antibiotics as being indicated primarily for the treatment of anthrax victims who are allergic to penicillin. However, ciprofloxacin and doxycycline are the antibiotics commonly recommended when there is a known or suspected exposure. More recently, doxycycline is being promoted as the oral prevention antibiotic of choice, in the hopes that any antibiotic-resistant microbes that eventually result might then be susceptible to ciprofloxacin.

SMALLPOX

Smallpox, a deadly viral disease, is also being mentioned as a leading candidate for another bio terrorist attack. The established therapy available for smallpox is to vaccinate before infection or fairly early after infection. Immune globulin therapy is also available to hopefully lessen the degree of infection and resulting illness. If these measures fail, supportive therapy is the only remaining traditional option. Either the patient's immune system eventually wins, or the patient dies. Furthermore, the patients who are fortunate enough to survive face significant skin scarring after the characteristic skin lesions finally resolve.

Smallpox is considered a significant threat as it has a case-fatality rate of 30% or more among unvaccinated persons. Furthermore, since routine smallpox vaccination ceased in the United States more than 25 years ago, the degree of continuing protection from very old vaccinations against contracting smallpox now is less than clear. Some experts feel the protection is largely gone (Henderson et al., 1999).

The ability of smallpox to be a potent biological weapon was already demonstrated long ago. During the French and Indian Wars from 1754 to 1767 British forces in North America were able to initiate smallpox epidemics among the American Indians (Steam and Steam, 1945). Blankets used by smallpox victims eventually reached the Indians, and death rates exceeding 50% were seen after some of the tribes were successfully infected.

The smallpox patient is most infectious to others from the onset of the characteristic rash through the next 7 to 10 days (Mack, 1972; Mack et al., 1972). This rash is preceded by high fever and a symptom complex that could certainly be confused with the flu. Especially progressive smallpox infections can result in widespread hemorrhage and death within only 5 to 6 days of the onset of the rash.

Smallpox vaccinations are not without risk (Lane et al., 1969). Encephalitis (brain inflammation), severe skin rashes, and even a progressive, sometimes fatal, infection directly resulting from the inoculation can all occur. A nontoxic alternative to this vaccination would be highly desirable.

The current rareness of both anthrax and smallpox is highlighted by the fact that the 2001 edition of Conn's Current Therapy does not even mention either of these diseases. Few physicians have any firsthand clinical experience in the treatment of these diseases.

Treatment Alternatives
Bioterrorism: Beyond Vaccinations and Antibiotics

After reeling from the enormity of the terrorist attacks on the World Trade Center buildings in New York City September 11th most Americans who were finally regaining their composure were sent reeling again from the postal anthrax attacks. While nearly everyone insists they are continuing to live their lives without altering their daily schedules, a continual low-grade worry over the well-being of ourselves, families, and friends has imposed itself on many of our psyches.

The idea of an untreatable, killer epidemic sweeping across the nation is certainly frightening. However, I will attempt to show you that our treatment options might not be as bleak or limited as they might seem to be. Let's first consider some of the known information about anthrax and smallpox, which are perhaps two of the most significant bioterrorism agents.

ANTHRAX

Anthrax is a bacterial disease that occurs primarily in one of four forms: cutaneous (skin), inhalation (lung), gastrointestinal, and oropharyngeal (mouth and throat). It is readily transmissible in a spore form that readily germinates into growing bacteria when a receptive host environment is encountered. So far the only two forms of this disease resulting from the postal attacks have been cutaneous and inhalation.

The cutaneous form of anthrax can occur on any exposed skin surface, progressing eventually to a blackened, ulcerated lesion. The blackened appearance of this lesion accounts for the name "anthrax," which comes from the Greek word for coal. Untreated, it can result in death about 25% of the time. When treated with antibiotics death is rare.

Except in the context of a widespread bioterrorist attack, inhalation anthrax is extremely difficult to diagnose. The incubation period can range from 1 to 6 days, initially presenting with flu-like symptoms. The next phase of the disease can proceed very rapidly to death after lung symptoms present. Difficulty breathing, coughing up blood, chest pains and profuse sweating are common symptoms at this point. The infection then proceeds to a blood poisoning that will further proceed rapidly to death even if antibiotic therapy is finally initiated. Although anthrax appears to be treatable by antibiotics in the early stages of the disease, the advanced inhalation form of this disease will typically not respond to such therapy, and death will result. An anthrax vaccine has been developed, but it is really only available to the military at this time. Furthermore, we are told that purified, antibiotic-resistant forms of anthrax for military use exist. Fortunately, such forms of anthrax do not yet appear to have been disseminated in any fashion.

Inhalation anthrax is especially deadly because of its rapid progression after the initial lung symptoms appear. This is largely due to the fact that anthrax is an infection that not only grows, but also produces potent toxins (Bhatnagar and Batra, 2001; Brossier and Mock, 2001; Mock and Fouet, 2001). In fact, the coughing up of blood is a reliable indicator that the toxins are being produced in critical amounts deep in the lungs. The antibiotic therapy for the anthrax organism has